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Atmospheric Measurement Techniques Discussions

Interactive comment on "Development and application of a mass closure $PM_{2.5}$ composition online monitoring system" *by* Cui-Ping Su et al.

Anonymous Referee #1

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General Comments: The manuscript by Su et al. developed a mass closure PM2.5 online integrated system and characterized the PM2.5 sources and composition in Shenzhen. One of the major concerns of this study is that, apart from sharing a sampling line, what is the difference between using them separately and using the sampling system including aerosol chemical speciation monitor (Aerodyne, ACSM), Aethalometer (Magee, AE-31), automated multimetals monitor (Cooper Corporation, Xact-625), and hybrid synchronized ambient particulate real-time analyzer monitor (Thermo Scientific, SHARP-5030i) ? What is the purpose and significance of establishing such a sampling system given that I already have these instruments? On the other hand, the manuscript fails to identify the new information and seems to be a report regarding sources and composition of PM2.5 in a different location and season. Before its publication, the

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following comments need to be addressed.

Specific Comments: 1. What is the difference between the sampling system and the separate detection by separate instrument?

2. What is the uncertainty quantification of chemical species measured by ACSM, AE31 and Xact-625? And what's the uncertainty quantification of PM2.5? What's the error margin of PM2.5 mass closure? What's the Detection Limit of each species?

3. More needs to be listed to support source apportionment results. For example, please make clear that Chl shows dominated contribution to coal combustion factor while negligible fraction in biomass burning. Besides the high mass loading of K in factor 6, is there any other evidences to support that factor6 is related to the biomass burning? In addition, the factor related coal combustion shows 3 peaks during daytime. Please explain this.

4. Although there is tight correlation between reconstructed and measured PM2.5, what are the reasons caused the underestimation in 10/20 and overestimation in 10/3? Please elaborate.

5. What ACSM is used in your manuscript? Q-ACSM or ToF-ACSM? Did you measure the PM1 species in this study (based on the reference of Nga et al., 2011)? if so, how about the gap of chemical species between the PM1 and PM2.5? Please mention it here. Also, more details in concentration and composition of PM species need to be shown wherever in the main text or the supplementary.

6. The frequency of data is negligible at PM2.5 > 80 μg/m3 in Fig.6. In my viewpoint, there might be a significant uncertainty in fraction of composition when PM levels are low. The authors need to address such uncertainties in the revised manuscript.

7. Line 31: "PM2.5 is currently a serious problem" is not suitable expression.

Please also note the supplement to this comment:

https://www.atmos-meas-tech-discuss.net/amt-2020-77/amt-2020-77-RC1-supplement.pdf

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